# PORTABLE COMPUTING DEVICE HAVING AN ADJUSTABLE HINGE

## TECHNICAL FIELD

This invention relates to laptop computers and related computing devices which feature a base, providing a keyboard or keypad, and a movable cover which houses a display screen of a conventional type. More particularly, the present invention provides novel hinge mechanisms that allow the cover to be selectively movable with respect to the base between closed and opened positions. Unlike existing devices however, the cover can be slidably and selectively positioned along the base and can be fully inverted onto the base for slate style use.

## BACKGROUND OF THE INVENTION

In recent years, the popularity of laptop and notebook style portable computers has continued to increase. At the same time computer manufacturers have responded to consumer demands for more practical and convenient designs by making such computers more powerful, more compact and more lightweight. Thus it has been desired to design such computers which include many if not all of the features of conventional desktop computer systems in a versatile lightweight package which claims very little space. This goal has been facilitated by the advances in semiconductor technology and liquid crystal display (LCD) technology. A common configuration for laptop computers is to house hardware components such as the CPU motherboard, hard drive, floppy drives, as well as the keyboard and battery power supply within a main case portion. A LCD screen is housed within a cover member which is hingedly affixed to the case portion. The LCD screen typically interfaces with the CPU by way of a flexible ribbon cable so as to permit the cover member to pivot relative to the main case so that the case may be closed or positioned such that the LCD may be viewed by the user.

This common configuration has drawbacks which many users find annoying, for instance, the LCD/cover member may for all practical purposes be placed in only two positions—open and closed. While some units include hinges having a friction component sufficient to maintain the LCD in varying angular positions relative to the case portion, the range of adjustable angles is very limited. Further, it has been found that the rather high profile that results when the LCD/cover is in the open or in-use position, is of such a nature as to make it difficult to use the computer unit in cramped confines such as in automobiles or in aircraft. Attempts to overcome this problem have included hinge designs which permit positioning of the display screen in a wide variety of angles relative to the case. Other designs include swivel devices which permit angular positioning of the display screen relative to the case on multiple axes.

A relatively recent trend in portable computer design has been the use of stylus or pen-based input devices. Typically, a touch panel, or pen-input panel is used in conjunction with a conventional LCD, thereby allowing users to input data or select functions by simply touching the panel or by using a specially designed stylus. These pen-based units are commonly referred to as slate-style computers because the display typically does not pivot relative to the case as in notebook style computers. Such slate style computers are preferred by many users due to the small amount of space claimed by the unit as well as the ease of inputting data.



However, many users find the lack of a keyboard for input to be a disadvantage. In response to this some manufacturers have attempted to compromise by designing units having both keyboard and pen-based input capabilities. Nevertheless, such compromises have fallen short of satisfying the consumer, due to the difficulty in using such devices. For example, some designs simply allow an external keyboard to be connected to a slate-style unit, such two-piece designs are not conveniently ported. Other designs have included small nonstandard keyboards in conjunction with pen-based input, this also has proved to be inconvenient. Yet another design provides a display screen which is detachable from the base portion and capable of being reattached in the upright (notebook) position, the slate position, or reversed to close the unit. Again the two-piece design makes such devices cumbersome to change from one position to another.

It can thus be seen that there is a need for a portable computer which combines all of the features of both notebook style and slate style devices in a single, lightweight, compact unit, wherein the display/cover member is capable of being positioned in a wide variety of angles while integrated with the main case portion.

## SUMMARY OF INVENTION

It is therefore, an object of the present invention to provide a portable computer having a lightweight, compact design.

It is another object of the present invention to provide such a computer which includes both keyboard and pen-based input capabilities, in conjunction with a liquid crystal or other appropriate display screen.

It is a further object of the present invention to provide such a computer wherein the display may be selectively positioned in a variety of angular positions relative to the main unit so as to permit operation of the unit in laptop, keyboard mode or slate style pen-based mode.

It is a still further object of the present invention to provide such a computer wherein the display and touch panel may be inverted so as to provide a cover for the unit.

In general, an improved laptop style computing device comprises a base portion, a display portion containing a display screen and a touch input panel and, means for selectively positioning the display portion in selective angular engagement with the base portion in a plurality of angular upright positions for use in the laptop mode, as well as the display up position for slate style use and the display down position for closing the device.

At least one or more of the foregoing objects, together with the advantages thereof over the known art relating to hinge mechanisms for laptop computer devices, which shall become apparent from the specification which follows, are accomplished by the invention as hereinafter described and claimed.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of the first embodiment of the present invention with the lid/display in the closed position;

FIG. **2** is a view similar to FIG. **1** but depicting the lid/display in the upright or laptop position;

FIG. **3** is a view similar to FIGS. **1** and **2** but depicting the lid/display in a low profile angle of adjustment;

FIGS. **4** is a view similar to FIGS. **1–3** but depicting the lid/display in the slate style position;